[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR INFORMATION ASSOCIATION
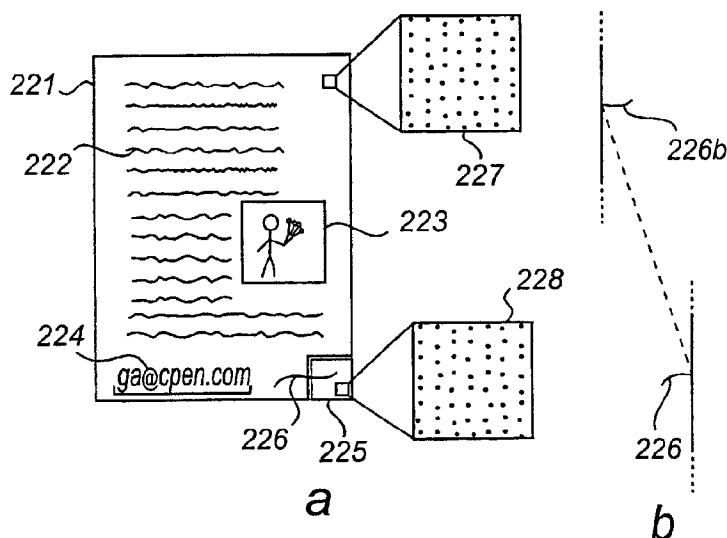
(57) Abstract: Method and system for information association based on an absolute position coding pattern comprising dots or markings which codes coordinates for a position on an imaginary surface. The imaginary surface comprises several regions which are divided in areas, each defined by said coordinates. Hand-written information is digitized by a handheld device which is moved over a surface provided with said pattern and acts like a pen to make notes on the surface. At the same time, the pattern is sensed and coordinates for the pen is calculated regularly. By passing the handheld device over the borderline between areas having different coordinates, a hyperline is generated having a discontinuity. Such a hyperline is easily recognized by the computer system and is used for connecting information at different areas, giving information some properties, like color, or performing an action on the information, such as encryption, or transferring the information to a recipient.

patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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METHOD AND SYSTEM FOR INFORMATION ASSOCIATION

AREA OF INVENTION

The present invention relates to a method and system for information association and more particular to association of information written by hand and converted to digital format by

5   a handheld device.

BACKGROUND ART

Information has been noted for hand by pen on paper since several hundreds of years. However, paperbased information has drawbacks, such as being permanent and difficult to change and

10   distribute.

Recently, in personal computers, information may be entered by keybords and displayed by display devices, like CRT or LCD screens. However, computerbased information has drawbacks, such as being difficult to enter by keyboards and difficult to

15   read on a computer screen.

Several suggestions exists for digitizing handwritten information for transferring such handwritten information to digital devices, such as computers.

As soon as the information has been entered in the

20   computer, it may be communicated to others, such as by e-mail or SMS or via an Internet connection or as a fax via a fax modem.

In a computer context, a mouse is often used for selecting information and acting upon such selected information. A typi-

25   cal situation involves draging a mouse pointer over characters of information displayed on the screen to select said information. Then, the mouse pointer is pointed at a certain position on the screen, such as in a menue system or pallette, in order to initiate certain actions to be performed upon the selected

30   text, such as changing the font type or size.

The same type of selection may be performed in the pen and paper situation, such as encircling a piece of information or yellow-mark information. However, since the information is fixed, no action can normally be taken upon the selected in-

35   formation, which however, may be highlighted to the reader.

Patent Application No. PCT/SE00/01895, filed by applicant,

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the technical disclosure of which is incorporated herein by reference, discloses a system in which a handheld device and a paper is used for jotting down information in a traditional way, whereby at the same time is generated a digital graph

5   comprising one or several traces of lines of the movement of the pen over the paper, which graph may be transferred to a computer. In such a system, the advantages of using a pen and paper, which many users prefer, is combined with the flexibility of the computer to communicate and store the informa-

10   tion to obtain the best of the two worlds. In this patent application, the paper is provided with an absolute position coding pattern, comprising dots or markings. The handheld device includes an optical sensor which registers the pattern. A mathematical algorithm calculates the absolute position in

15   the form of coordinates for the position of the handheld device by means of the absolute positon coding pattern.

The traditional pen is in this way tranformed into an input means for the computer and the computer may be used for storing the information instead of or in combination with

20   arranging the paper in a binder. Moreover, the information may be communicated by means of the computer. However, the information inserted by this input method is graphical and not in character coded format, which the computer is more apt to.

The information included in the graphical input comprises

25   information which may be used for different purposes:

1) The information comprises a picture, like drawings or lines with a mutual relationship, which may be interpreted by the human being, such as characters, symbols, or a drawing. This is the very information which is put down on the paper

30   and which the user wants to be treated in one or the other way, such as being archived or being sent to a recepient. This information is below called message information and is stored in a graphical format such as a vector format or as a collection of pixels.

35   2) The portion of the message information which comprises handwritten characters, can be exposed to further treatment, such as character recognition (OCR, optical character recognition or ICR, intelligent character recognition) for converting

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the information to a character format, such as ASCII, which
may be used by the computer, e.g. for searching purposes or
for cataloging. Also symbols, such as shorthand symbols or
icons, may be recognized which by the user has been predefined
5   to have a certain meaning. This information is below called
character information.

        3) The information may further comprise an indentification
of the handheld device which is used for writing the informa-
tion. The identification of the handheld device is below
10 called pen-ID

        4) Furthermore, there is information on where at the
surface the information was jotted down, so called absolute
position information.

        5) There may be further information, such as time informa-
15 tion obtained from an internal clock, pressure information
from a pressure sensor about the pressure of the handheld
device towards the paper, and angle information about the
angle between the handheld device and the paper. From the time
information, speed and acceleration of the handheld device may
20 be calculated.

        The present invention is mainly focused on the information
of type 4) and 5) above, such as absolute position informa-
tion.

        There are further known systems for obtaining absolute
25 position information in a pen and paper system, see for
example US 5,882,434 and US 5,051,736. Such previously known
systems describe use of such information for digitizing messa-
ge information, i.e. group 1) indicated above.

        The information may be used in different places in the
30 system so far described. The handheld device may comprise a
picture sensor and a processor with associated memory and an
energy source such as a battery. Moreover, there may be a
communication device, such as a wire or a connection to a
computer or an IR link or a shortrange radio connection. There
35 is also a pressure sensor which senses if the handheld device
is applied to the paper and the pressure between the handheld
device and paper.

        It is possible to transfer the information from the hand-

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held device to an external computer in the nature of a video signal from the sensor and all computing taking place in the external computer. Alternatively, the handheld device may be provided with means for image processing. Thus, the handheld

5   device may be provided with a processor and/or logic arrays, which processes the video signal obtained from the sensor and calculates the absolute position from the dots or markings imaged from the surface of the paper. This image processing comprises adjustments for perspective effects from rotation

10   and inclination of the handheld device in relation to the paper and compensation for different light conditions. The handheld device may further comprise computer programs which calculates the x-y-coordinates of the handheld device on an imaginary surface.

15   Information may be stored in the memory of the handheld device in the nature of a coordinate train, which may be converted to a vector format. This message information may be transferred to a computer, which draws a graph on the screen of the computer by means of a computer program. The message

20   information may be sent to a local or distant printer for direct printout or to a dumb display device which only has the ability to draw the graph at the screen, such as a TV screen.

         Interpretation of the message information to a character format may take place in the handheld device or in a computer

25   system.

         In addition to coordinate information there is also time information, such as time information for each coordinate, which is recorded each hundredth of a second when the pressure sensor is activated. Moreover, there may be information about

30   the pressure towards the support and inclination and rotation information for the position of the handheld device in rela-tion to the support.

         Message information may be communicated to a recepient in the nature of a fax or an e-mail. In this situation, the hand-

35   held device may cooperate with a mobile telephone via a wire, IR or radio link. The mobile telephone may operate as a "modem" for transferring the message information to a telefax apparatus at a telefax number, or to Internet via calling a

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modem pool of an Internet operator. In this case, it may be
required that certain portions of the message information is
character recognized, which may take place in the handheld
device. Such recognized information may be used as a telefax

5   number or an IP address for communication via Internet.
Address information in the mobile telephone may alternatively
be used.

The computer may perform the same functions as described
above as performed in the handheld device.

10   The information may be transferred to a server via
Internet at a preprogrammed IP address and the character
recognition may take place in said server.

In the above situations, it may be desired to use the
input device, i.e. the handheld device for selecting certain

15   text and indicate some actions to be performed on such infor-
mation. Actions may be qualifying actions, such as qualifiying
certain properties of the selected information, such as color
or line thickness etc. Actions may also be operations to be
performed on the selected information, such as character

20   recognition or encryption. Other types of actions may be to
expose the information for a program for encapsulating the
information to a e-mail standard format to be transmitted as
an e-mail. Further types of actions may be to compile the
selected information in a binder or folder in a computer file

25   system, as further described below.

Thus, there is a need for a method and a system for
associating information with other information, actions or
qualifications.

DISCLOSURE OF THE INVENTION

30   A first object of the invention is to use absolute
position coordinates for providing a method and a system for
associating information as described above to make such
association simple and intuitive.

A second object of the invention is to provide a method

35   and system for digitizing handwritten information by means of
a handheld device and associating other information, actions
or qualifications to said information by using said handheld
device.

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A third object of the invention is to provide a method and a system as described above, which takes advantages of an absolute postion coding pattern, which codes coordinates for a postion of the handheld device.

5   A fourth object of the invention is to provide a method and system for providing a partly discontinuous absolute position coding pattern, whereby the discontinuity is used for said association.

According to an aspect of the invention, there is provided
10   a method and system for generating an association with regard to information, which is arranged on at least one support provided with an absolute position coding pattern and by means of a handheld device arranged to sense said absolute position coding pattern. The handheld device is passed over said
15   support for sensing said absolute position coding pattern. When it is sensed that the handheld device passes over a discontinuity in the absolute position coding pattern such discontinuity is interpreted as an association regarding the information present on said support.

20   The support may comprise a first area in which said absolute position coding pattern codes continuous first coordinates. The information is provided on the first area and is connected to the first coordinates. Moreover, the support comprises a second area provided with an absolute position
25   coding pattern which codes second coordinates which are discontinuous with the first coordinates. When the handheld device is passed in a single movement from one area to the other area, the discontinuity is sensed.

The association may involve that a predetermined action is
30   undertaken on the information, such as sending the information as a message, such as an e-mail, SMS or fax, to a recipient. The recipient may be defined in the information or be defined by the association. In the last case, the recipient may be defined by the coordinates in said second area, which coordi-
35   nates are connected to information about the recipient.

The association may involve that the information is stored at a predetermined location in a computer system. Such loca- tion may be a predetermined folder in a personal computer

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defined by the coordinates of the second area.

The association may involve that an operation may be
performed on the information, such as encryption or character
recognition.

5   The association may involve that a qualification is
imposed on the information. Such qualification may be under-
line, color, line width, yellow mark, secret, personal, etc.

The information which it to be qualified may be selected
by passing the handheld device from the second area, to the
10   first area and encircling the information to be qualified and
possibly back again to the second area.

The association may involve that first information in a
first area is connected to second information in a second area
into a single information.

15   The association may be over more than two areas, multiple
association. Thus, the handheld device is passed over three or
more areas having discontinuous coordinates for associating
three or more information, actions or qualifications.

Other objects, features and advantages of the invention
20   appears from the detailed description of the invention given
below with reference to embodiments of the invention shown on
the drawings.

SHORT DESCRIPTION OF THE DRAWINGS

Fig. 1a is a schematic diagram of a page according to the
25   invention having a drawing and text made by hand.

Fig. 1b is a schematic diagram of the page of Fig. 1
separated into three pieces.

Fig. 1c is a schematic diagram of a line drawn over two
separated and offset pieces of the page of Fig. 1b.

30   Fig. 2a is a schematic diagram of a page provided with a
send line.

Fig. 2b is a schematic diagram of the digital representa-
tion of the send line in Fig. 2a.

Fig. 3 is a schematic diagram of an imaginary surface
35   divided in several regions.

Fig. 4 is a schematic diagram similar to Fig. 3a of a
business card provided with a send line.

Fig. 5 is a schematic diagram of a page provided with two

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messages and two labels.

Fig. 6 is a schematic diagram of an information handling system according to the invention.

Fig. 7 is a schematic diagram of a ruler provided with
5   boxes corresponding to different associations.

Fig. 8 is a schematic diagram of a handheld device to be used according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

Fig. 1a discloses a paper page 111 provided with a drawing
10   112 of a sun and a text 113, "HELLO" all drawn by hand by a pen on the paper.

The paper is provided with an absolute position coding pattern as indicated in the small square 114 which is enlarged to the right. The square is provided with several dots arran-
15   ged in a pattern as described in more detail below. Although only square 114 is shown with the absolute position coding pattern, the entire page is provided with such a pattern. The pattern is more or less invisible for the naked eye, since the dots are small, such as having a diameter of 0,08 mm, and
20   arranged at a small distance from each other, such as 0,3 mm. The pattern is used for digitizing the movement of the pen over the paper. The pen is provided with an optical sensor which images the dots. A computer in the pen calculates x-y-coordinates from the image and the arrangements of the dots,
25   as described below. Thus, a digital representation of the drawing 12, the sun, and the text 13, "HELLO", is provided.

The page is divided in three parts by lines 115,116. Fig 1b shows the page separated into three pieces. The three pieces may now be handled separately and moved to different
30   locations. However, the pen and the digitalization system is unaware of the fact that the page is separated. If the pen draws a new line 117,118 from one of the pieces to another of the pieces, which is offset from the first piece, the physical continuous line 117,118 on the page is represented in the
35   digital world as a discontinuous line 117',118' as shown in Fig. 1c. The discontinuity 119 represents the displacement of the two pieces in relation to each other.

According to the invention, the concept of a continuous

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physical line which is represented as a digital discontinuous
line is used for generating associations between information.
Such a continuous physical, discontinuous digital line is
called a hyper-line.

5   Fig. 2 shows a simple example of this concept. A note book
paper 221 is provided with a text 222 and a drawing 223 as
well as address information 224, ga@cpen.com. The page is
provided with a code pattern over the entire side, as shown by
enlargement 227.

10   Moreover, the page comprises a send button 226, which also
is provided with an absolute position coding pattern 225,
however, discontinuous from the code pattern of the rest of
the page.

        The page is provided with text and drawing at a suitable
15 time, such as during a lecture in a classroom. The address
information is also inserted. The information is jotted down
by a handheld device, such as a digital pen, which at the same
time accumulates the positions which the pen assumes and form
a digital representation of the information, which may be
20 stored in the memory of the handheld device.

        When the page is completed, the user may want to send the
page as an e-mail to the address indicated. He then draws a
hyperline 226 joining the send button 225 with the paper 221.
The digital pen is provided with a program which recognizes a
25 hyperline and starts a program whenever a hyperline is drawn.
The program looks at the coordinates included in the two por-
tions of the hyperline. In this case the hyperline starts in
paper area 221 and ends in the send box 225, but the opposite
is also possible. The end 226b of the hyperline comprises
30 coordinates from an area separate from the page 221. The
program interprets these coordinates as an instruction to send
an e-mail with the information included in an area defined by
the rest of the line 226a. The area defined by the rest of the
line, is the entire page 221. Thus, an association between the
35 paper area 221 and the send box 225 is obtained by the hyper-
line 226, which defines an action to be undertaken on page
221.

        In order to further clarify how associations may be

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generated by hyperlines according to the invention, a further description of the absolute position coding pattern and the use thereof may be required, with reference to Fig. 3.

The absolute position coding pattern may comprise dots
5   arranged adjacent crossing points of a rectangular raster, having perpendicular raster lines with a distance of 0,3mm. The dots are displaced from the crossing points by a small distance, such as one sixth of the distance between the lines and in the direction of the lines. Such displacement indicates
10 a value for each dot. Since there are four displacement directions, each dot may represent four values, "0", "1", "2", "3". The raster may be virtual, in the sense that it is only used as a help for defining the positions of the dots. It is not printed on the surface together with the dots and is thus
15 invisible.

If an optical sensor of the pen images a surface square comprising 6*6 dots, these 36 dots may represent a numeral which may have 4^36 different values, since each dot may have four different values, as explained above.
20 These 36 dots are arranged to define coordinates for a position of this set of dots on an imaginary surface, which may be very large. The coding is floating in the sense that each dot may take part in several squares of 6*6 dots. Such an imaginary surface is schematically depicted in Fig. 3.
25 This large imaginary surface 301 may be divided in regions, each having assigned separate properties or uses. Thus, in Fig. 3 there is shown a note book region 303, a common region 304, an application region 305, a business card region 306, a diary region 307 and a send box region 308.
30 Moreover, there may be a local sync region 302, which is divided in several sub regions, such as a send box region 308', a diary region 307', a business card region 306', a note book region 303', a common region 304' and an application region 305'.
35 As clearly shown in the note book region 303, the region is divided in several areas 309, each of a predefined size.

In order to give an example, it is supposed that the total imaginary surface comprises x-y-coordinates of a binary type,

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i.e. defined by zeros and ones. The coordinates has a length
of 36 bits for each of the x-coordinates and y-coordinates and
codes a surface having 2^36 positions.

5   The different regions may be dedicated for different
operations or functions. In the example, the send region 308
is dedicated to be used when generating a send command to the
pen. For example, the send region may be defined as the region
in which all coordinates start with x=0001.... and
y=0001...... To be more general, each region may be defined by
10   the first four bits of each of the x- and y-coordinates. In
this manner, 256 regions may be defined. Only 6 regions are
shown in Fig. 3.

As shown in the note book region 303, the region is divi-
ded in a number of equally large areas 309. Suppose that each
15   such area is slightly above 1 square meter, 12 bits are requi-
red for defining this surface with a resolution of 0,3 mm (0,3
mm * 2^12 = 1228,9 mm). Thus, the last twelve bits are used
for defining the position inside the note book page area. The
remaining twenty bits, (36 - 4 - 12 = 20) are used for defi-
20   ning the specific page area in the note book region. Thus,
4^20 different page areas may be defined, which means
1 099 511 627 776.

The send box region 308 is divided in still smaller areas
comprising 19,2mm*19,2mm, which corresponds to 6 bits. Thus,
25   the total number of send areas that may be defined is
4^26 = 4 503 599 627 370 496.

In Fig. 3, the areas are shown as rectangular areas having
no overlap. The areas may have any shape. It is also possible
to have regions and areas which overlap, but are separated by
30   mathematical algorithms.

Information about the imaginary surface and the extent of
the regions are stored in the system, in one or several compu-
ter systems, as described in more detail below.

The absolute position coding pattern, which defines the
35   coordinates for the above positions, may be applied at any
product, such as paper, plastics, etc. It may also be integra-
ted or applied to a computer screen. In the following, a
product provided with such a pattern is called "digital

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paper".

This coding pattern as well as a handheld device, such as
a pen, is disclosed in WO 01/16691, the technical disclosure
of which is incorporated herein by reference.

5   The pen may comprise a program which makes it possible to
differentiate between information which is to be stored in the
pen, information which should be transferred to the computer
of the user, and information which should be sent to a fax
number or via a modem or that should be sent to a server at a

10   predetermined IP address. Thus, a certain region comprising a
predetermined set of coordinates may be dedicated to be trans-
ferred to a specific recipient, for example, information
written in the diary area 307 is always transferred to a
calender program in the users personal computer or computer

15   system. Another example is that all information written in the
local sync region 302 is transferred to the users personal
computer via a local sync operation and program.

Thus, the pen and the computer system may have information
about what the different regions at the imaginary surface are

20   dedicated for. No specific component of the system needs to
have full information about all the different regions, but
such information may be distributed over several units.

Fig. 4 discloses a business card 410 which is arranged to
use the present concept of a hyperline. Only the backside of

25   the card is shown in Fig. 4. Each human being may be assigned
his own area in the business card region 306, comprising coor-
dinates privately owned by him. The assignment is registered
in several servers, for example one per country. The IP
addresses to these servers are stored in a central server. The

30   coordinates of this private business area is coded on the
backside of the business card in a personal box 411. Coordina-
tes from an send area from the send region 308 is coded in a
send box 412. Finally coordinates from a common area 304 is
coded on the rest of the business card.

35   When using this business card for the purpose of sending
information, the user writes a message on the backside of the
business card in area 413, such as "Let's meet at my office at
2 pm tomorrow". He than indicates the e-mail address of the

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recipient in the address field 414. Finally, he draws a hyper-
line which passes from the area 413, through area 412 to area
411. This hyperline is interpreted by the pen program to send
an e-mail with the message to the indicated address with the
5   business card owner as sender, and possibly also a copy to the
business card owner. It is realized that area 413 taken from
the common area may be replaced by the private coordinates,
whereby box 411 is superfluous.

      Moreover, it is possible to use the pen-ID, in order to
10   replace the address indication. This is done by writing with
the users pen on the recipients business card. Then the system
is programmed to send the message to the owner of the business
card with the owner of the pen as sender.

      It is realized that the server which holds the information
15   of the private business area distribution may also comprise
all details of the business card owner, so that a pen owner
may obtain all such information only by making a marking at
the personal box 411. Further variants are possible as disclo-
sed in Swedish Patent Application No. 0003195-5, filed
20   September 7, 2000, the technical disclosure of which is
included herein by reference.

      Fig. 5 dicloses a somewhat different use of association. A
page 510 is provided with an absolute position coding pattern
over the entire surface. Two messages 511 "Call Eric +46 46
25   123 123" and 512 "Meeting at Monday, 2 pm +46 46 123 123" are
drawn by hand with a handheld device according to the inven-
tion. The user has a number of labels 513,514, each having its
own coordinates arranged thereon. The label is provided with
an adhesive at at least a portion of the backside, and may be
30   adhered to the page 510 where desired. The label may include
printings which tells the operation which the label is asso-
ciating to the information, such as
TO DO and SMS.

      A hyperline 515 is drawn from the label 513 and encircling
35   message 511 and returning to the lable 513. The information
encircled by the hyperline is then associated the function of
the label. In this case the information is transferred to the
owners computer and inserted in a to-do-list.

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Another hyperline 516 is drawn from the second label 514
and encircling the second message 512 and back to the label.
The information encircled by the hyperline is then associated
the function of the label. In this case the message is sent as
5   a SMS to the telephone number indicated in the message.

The labels may be replaced by a ruler, as shown in Fig. 7
including several separate areas, each representing a function
or a qualification. Thus, ruler 710 is provided with an area
for sending a SMS 711, an area for sending an e-mail 712, an
10 area for sending a fax 713, an area for storing the informa-
tion in a specific folder called MY-folder 714. Moreover, the
information may be qualified in different respects by a hyper-
line, and the ruler includes qualifiers such as an area for
underline 715, an area for italic 716, an area for color 717,
15 an area for personal 718, an area for secret 719. Moreover,
there may be associations for certain operations, such as an
area for encryption 720, an area for character recognition
721, and an area for character recognition and translation to
a predefined language 722. Finally, there is an association
20 for connection of the users v.card information to the document
723. Further areas may be arranged such as further folders and
further v.card information areas for different persons, such
as collegues.

The ruler is placed adjacent a page comprising the
25 information which should be associated according to the
present invention, and a hyperline is drawn from the ruler
area to the information.

The information may be encircled as mentioned in relation
to Fig. 5. Alternatively, the entire contents of the page in
30 the case of a note book page as mentioned above, may be inclu-
ded as the message.

Another use of the ruler is that the ruler is placed
adjacent a paper comprising an absolute position coding
pattern coding coordinates which are linked to information
35 appearing at the page. Such an example is a printed book
provided with such a pattern. When a paragraph is encircled in
said book and associated with the area 714, Store in MY
folder, the pen is arranged to start a program which looks up

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which publisher has printed the book, which is defined by the
coordinates, and contacts the server of this publisher, and
gives the exact coordinates of the encircled paragraph. The
publisher has this paragraph in ASCII format in his server and
5   sends this paragraph to the recipient as defined by the pen-
ID.

        Fig. 6 discloses an embodiment of an information handling
system in which the present invention may be used. The system
comprises a handheld device 401, which in this case is a
10   combined ordinary pen with a stylus that may dispense inc or
other material leaving a permanent trace on a paper 402. The
pen may also comprise an optical sensor for imaging a pattern
of dots or markings provided on the paper and generating coor-
dinates for the position of the pen on the paper. The coordi-
15   nates are calculated by a microprocessor arranged in the pen
and are stored in a memory. The pen is provided with an
identification number 403, called pen-ID, which may be a
manufacturing number hard coded in the memory or otherwise
assigned to the pen. The pen-ID may not be changed. The pen is
20   further described with reference to Fig. 8.

        The paper is provided with an absolute position coding
pattern over the entire page as depicted by the enlargement
404. The paper is provided with information 405, such as
"Message 1", "Message 2", "Message 3", which may be entered by
25   the pen ("Message 1" and "Message 2") or may be preprinted on
the paper ("Message 3"). Furthermore, there is arranged boxes
408, 409, 410 and 411, which are labeled SMS, FAX, @ and SEND.
Finally, there are lines 412 and 413 provided with demarcation
lines between which letters or numerals may be written.

30   The pen is arranged to write on the paper, for example
"Message 1" and "Message 2". During the writing, the pen
senses the dots of the pattern and calculates position coordi-
nates for the pen at regular time intervals, such as 100 times
per second. Thus, a digital trace of the pen movement is
35   formed in the pen. The pen may also, in addition to position
information and time information, store information about the
pressure between the pen and paper and the inclination and
rotation of the pen in relation to the paper. The information

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is stored as a set of coordinates, which may be converted to a vector format.

Information is also entered at the lines 412, 413, as shown "ga@cpen.com". Such information may be e-mail addresses,
5   telefax numbers, SMS telephone number etc. The information may also contain text to be included in the subject line of an e-mail.

Then, a hyperline is drawn from the box 410 into the page area 402, in order to qualify the information to be sent as an
10 e-mail.

Finally, a hyperline is drawn from the send box 411 to the page area 402. The line portion in the send box indicates to the pen that a send operation should be performed, and the hyperline indicates that the send operation should be perfor-
15 med on the information included at page 402. The previous hyperline indicates that the send operation should be an e-mail.

The pen is in contact with the Internet via some suitable means not shown at Fig. 6, but further explained in connection
20 with Fig. 8. A send action involves that the pen 403 sends a data packet comprising coordinates for identification of the owner of the particular coordinates for which the service should be performed, as indicated by line 421. In the present case, coordinates obtained from the box 410 is sent together
25 with the pen-ID, to a server 420 at internet which is located at a specific IP address, which is stored in the pen. The coordinates from box 410 is interpreted by the server, by means of a database table 423, as belonging to an e-mail operator, such as Telia AB. Then, the server returns an IP
30 address for Telia AB to the pen, as shown by line 422.

In the next step, the pen sends a request, as indicated by line 432, including the pen-ID, to the server 430 for Telia AB, the address of which was obtained in the step outlined above. The server 430 looks in a database 431 in order to
35 determine if the pen-ID has authorization and a contract for the requested service and sets up a receiving program, and finally sends an acknowledgement signal together with some information about which information should be transmitted,

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such as format, size etc. Then, the pen prepares a data
packet, with the information, in this case the e-mail address
of the recipient, any information to be included in the
subject line, and the very information, which may be graphical
5   etc, which is sent to the Telia server 430 as indicated with
line 434. The Telia server performs its servicing and trans-
mits the e-mail to the recipient.

     In the situation with an e-mail, some of the above actions
may be dispensed with, so that the message may pass directly
10   from the pen to the e-mail service provider.

     In another situation, the page 402 may be an advertise-
ment, for example for company A, in a newspaper or magazine.
In this case, the send button comprises information about the
advertisement owner A. As indicated above, the send button is
15   selected from the send button region which comprises 4 503 599
627 370 496 different send buttons. That many different compa-
nies may obtain its own send button.

     The process is the same as indicated above, except that
the first message sent according to line 421 comprises the
20   send button coordinates and the pen-ID. The server 420 inclu-
des a register over send button owners in database 423 and
returns the IP address of the advertisement owner, i.e.
company A. Then, the pen contacts the company A server and
sends the information as requested by that server.

25   A handheld device that may be used according to the
invention is shown in Fig. 8. The handheld device, which also
is called a pen above, comprises a housing 811 with an opening
812 at one end thereof. A light source 813, such as one or
several LEDs illuminates the surface below the opening 512,
30   normally the paper surface. An optical sensor 814 is arranged
to sense dots or markings arranged on the paper visible
through opening 812. There is normally an optical system such
as lenses or mirrors. The sensor is a two-dimensional array
and delivers an image signal to a microprocessor 816 compri-
35   sing a memory 817. A power source such as a battery 815 is
arranged to power the pen. A stylus 818 is arranged adjacent
the opening 812 in order to leave a trace on the paper as an
ordinary pen. The stylus may dispense inc which is invisible

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by infrared light, and the LEDs and the sensor may operate at
IR light, which means that the stylus trace do not interfere
with the sensing of the coding pattern or dots. The pen may be
provided with one or several buttons 819 in order to operate
5   the pen, such as on-off switch. Moreover, the pen may be
provided with a display screen 821.

In order to transmit the information from the pen, it is
provided with a short-range radio transmitter and receiver
820, which may establish a connection with an adjacent compu-
10   ter or mobile telephone and further to Internet. Such a short-
range radio communication system is manufactured by Ericsson
Radio System AB, a Swedish company, under the trademark
BLUETOOTH. Other communication systems may be used as well,
such as IR communication, or wire.

15   The pen may accumulate information in the memory while not
being connected to Internet and transmit such information when
connection is established, for example during night time, when
the pen is placed in a cradle. The information in the pen may
be erased upon transmission, or may be maintained until a
20   delete order is given by the user.

As is understood by the examples given above, the data
transfer structure is very flexible and makes it possible to
use a single server with associated database, for keeping
track of different owners of certain services included in the
25   system, while this server is revealed from the heavy traffic
of the complete information transfer.

In the above examples, a hyperline has been used for
interconnecting or associating information with other infor-
mation, services or operations. In the above examples,
30   association has been used for defining which regions and areas
that should be included in a sending operation. A hyperline is
formed comprising coordinates from several different areas in
one and the same line. The pen comprises a pressure sensor
which indicates when the pen is in contact with a support and
35   a line or a trace is formed. It is only when the pressure
sensor is activated and the pen is in contact with the support
that the pen senses and registers coordinate positions and at
the same time a line is drawn on the support by the pen. This

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physical line is continuous and extends over the surface of
the support, such as across two overlapping pages of paper.
The digital representation of this continuous line comprises
one or several discontinuities when the pen passes over a
5   borderline between non-continuous areas. Thus, a hyperline is
a digital representation of a physically continuous line, in
which the digital representation comprises one or several
discontinuities.

      Thus, a single line or a continuous trace comprises coor-
10   dinates from several different regions and/or areas. One
example of a hyperline is the above-mentioned send line, which
starts or ends in a send box. The send box indicates that a
send action should be undertaken by the pen. The send program
of the pen may be arranged to include coordinates from each
15   region or area of the hyperline, in the information packet
generated. The coordinates from the send box indicates that
the pen is to initiate a send function to a specific pre-
programmed IP address in which a server is positioned, and
which comprises a database over the different subscribers of
20   the system each defined by the coordinates of the send box.
The coordinates from the remaining regions or areas are used
by an application or a program in the server or computer which
is to receive the information, and indicates to this server or
computer which program is to be started, such as an e-mail
25   program.

      A hyperline may be used in other occasions than as a send
line. Thus, a hyper line may be used for qualifying certain
information.

      One example is that a user's messages jotted down at a
30   notebook page is to be sent by an e-mail to a recipient. The
user has a business card from the receiver with the personal
coordinates of the business card owner at the backside.
Instead of writing an e-mail address, the user positions the
backside of the business card on the note book page and draws
35   a hyperline from the business card to the note book page so
that the hyperline registers coordinates from both areas. When
this information is analyzed by an e-mail program, which is to
send the information, the e-mail program looks for a hyperline

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which may give information about an e-mail address and finds
this hyperline. The program sends a question or request to an
internet server about which person the business card coordi-
nates belong to and receives the business card owners e-mail
5   address in return.

The user may have predefined a number of e-mail addresses
in certain personal areas in the users private area, so that a
hyperline from such a predefined area results in that the
program searches in a specific database after the preprogram-
med e-mail address. Also the pen-ID may be used for personal
information, such as the fact that all e-mail communication
15   should be sent as a copy to the pen-owners e-mail address as a
confirmation.

The user may also have preprogrammed other operations
which by means of a hyperline may be associated with informa-
tion in different manners. A user may have stored all his
20   previous notes at a private personal computer and wants to
find a certain page. He has retained a small piece of said
page and puts it beside the function area which he has
predefined as a search function. A hyperline between the
function area and said piece establishes an association
25   between the function area and the note book page. The search
program can now easily locate the page by means of the
coordinates of said piece and may display it on the screen.
This search function may be extended to find information
stored at a server somewhere on Internet, i.e. information
30   floating in the "cyber space".

Further examples of the search function is the following:
In an article the author gives a reference list at the end of
the article, where each reference is coded with an absolute
position coding pattern according to the present invention. By
35   drawing a hyperline between the readers business card and the
coding pattern of the reference, an association is generated
which may result in that the reference is sent to the business
card owner via e-mail. By arranging an absolute position

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coding pattern adjacent each author, such a hyperline may
involve that predetermined information about the author is
sent to the business card owner.

      An association may be generated between more than two
5   areas, such as described above. Thus, a send request may
comprise a send box from a send region, one or several note
book pages from a note book region, personal information from
a business card region and payment information from a payment
region, etc.

10   Association may also be used for qualifying the infor-
mation to be sent. If a hyperline passes a secret area, this
means that the pen, when analyzing the hyperline, interprets
that the information to be sent should be encrypted by a
predefined algorithm. Other operations may also be qualified
15   by hyperlines, such as the fact that the information is to be
character recognized and possibly subsequently translated into
another language. The association may be interpreted by the
pen or by the program which handles the information trans-
mitted by the pen.

20   If an association is interpreted by the pen, it may be
used for activating different operation modes of the pen, such
as enabling encryption as mentioned above.

      The present invention has been described with an absolute
position coding pattern comprising dots arranged according to
25   a rectangular raster. Any type of absolute position coding
pattern may be used with the invention as soon as such pattern
may be arranged adjacent each other so that a discontinuity is
defined by a single line. However, the pattern also needs to
have a portion with continuous coordinates so that the discon-
30   tinuity may be discovered as something which is out of order.
In this way, the handheld device can easily recognize the
hyperline and immediately undertake action, if that was the
intention. Moreover, a hyperline may easily be discovered in a
message or a piece of information which normally have conti-
35   nuous coordinates.

      Hereinabove, the invention has been described with
reference to several embodiments of the invention. A skilled
person realizes that the features included in the different

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embodiments may be combined in other combinations than the above-mentioned combinations and such combinations are intended to be within the scope of the invention. The invention is only limited by the appended claims.

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CLAIMS

1. A method for generating an association with regard to
information, which is arranged on at least one support provi-
ded with an absolute position coding pattern, by means of a
handheld device arranged to sense said absolute position
coding pattern, characterized by
passing said handheld device over said support for sensing
said absolute position coding pattern;
sensing when said handheld device passes over a disconti-
nuity in the absolute position coding pattern;
interpreting said discontinuity as an association regar-
ding the information present on said support.

2. A method as claimed in claim 1, characterized in that
said support comprises a first area in which said absolute
position coding pattern codes continuous first coordinates,
and that said information is provided on said first area and
is connected to said first coordinates, and in that said
support comprises a second area provided with an absolute
position coding pattern which codes second coordinates which
are discontinuous with said first coordinates;
passing said handheld device in a single movement from one
area to the other area, for sensing said discontinuity.

3. A method as claimed in claim 2, characterized in that
said association involves that a predetermined action is
undertaken on said information.

4. A method as claimed in claim 3, characterized in that
said action comprises sending the information as a message,
such as an e-mail, SMS or fax, to a recipient.

5. A method as claimed in claim 4, characterized in that
said recipient is defined in the information.

6. A method as claimed in claim 4, characterized in that
said recipient is defined by said association.

7. A method as claimed in claim 6, characterized in that
said recipient is defined by the coordinates in said second
area, which are connected to information about the recipient.

8. A method as claimed in claim 3, characterized in that

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said action comprises storing said information in a predeter-
mined location in a computer system.

9. A method as claimed in claim 8, characterized in that
said location is a predetermined folder in a personal computer
5   defined by the coordinates of the second area.

10. A method as claimed in claim 3, characterized in that
said action comprises an operation to be performed on said
information, such as encryption or character recognition.

11. A method as claimed in claim 2, characterized in that
10   said association involves a qualification of the information.

12. A method as claimed in claim 11, characterized in that
said qualification is selected from the group comprising:
underline, color, line width, yellow mark, secret, and
personal.

15   13. A method as claimed in claim 12, characterized in that
the information which is qualified is selected by passing said
handheld device from said second area, to said first area and
encircling said information to be qualified.

14. A method as claimed in claim 12, characterized in that
20   the information which is qualified is selected by passing said
handheld device from said second area, to said first area and
encircling said information to be qualified and back to said
second area.

15. A method as claimed in claim 3, characterized in that
25   said first area comprises first information and that said
second area comprises second information, and that said
association involves that said first and second information
are interconnected to a single piece of information.

16. A method as claimed in claim 3, characterized in
30   providing at least a further area comprising coordinates which
are discontinuous with said first and second coordinates, and
passing said handheld device in a single movement over all
areas.

17. A method as claimed in claim 16, characterized in that
35   said further area comprises a link to personal information,
such as a v.card file.

18. A system for generating an association with regard to
information, which is arranged on at least one support

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provided with an absolute position coding pattern, by means of
a handheld device arranged to sense said absolute position
coding pattern, characterized by

a means for sensing when said handheld device passes over
5   a discontinuity in the absolute position coding pattern;
interpretation means for interpreting said discontinuity
as an association regarding the information present on said
support.

19. A system as claimed in claim 18, characterized in that
10 said support comprises a first area in which said absolute
position coding pattern codes continuous first coordinates,
and that said information is provided on said first area and
is connected to said first coordinates, and in that said
support comprises a second area provided with an absolute
15 position coding pattern which codes second coordinates which
are discontinuous with said first coordinates; which
discontinuity is sensed by the handheld device when it passes
in a single movement from one area to the other area, for
sensing said discontinuity.

20   20. A system as claimed in claim 19, characterized in that
said association involves that a predetermined action is
undertaken on said information.

21. A system as claimed in claim 20, characterized in that
said action comprises sending the information as a message,
25 such as an e-mail, SMS or fax, to a recipient.

22. A system as claimed in claim 21, characterized in that
said recipient is defined in the information.

23. A system as claimed in claim 21, characterized in that
said recipient is defined by said association.

30   24. A system as claimed in claim 23, characterized in that
said recipient is defined by the coordinates in said second
area, which are connected to information about the recipient.

25. A system as claimed in claim 20, characterized in that
said action comprises storing said information in a
35 predetermined location in a computer system.

26. A system as claimed in claim 25, characterized in that
said location is a predetermined folder in a personal computer
defined by the coordinates of the second area.

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27. A system as claimed in claim 21, characterized in that said action comprises an operation to be performed on said information, such as encryption or character recognition.

28. A system as claimed in claim 19, characterized in that said association involves a qualification of the information.

29. A system as claimed in claim 28, characterized in that said qualification is selected from the group comprising: underline, color, line width, yellow mark, secret, and personal.

30. A system as claimed in claim 29, characterized in that the information which is qualified is selected by passing said handheld device from said second area, to said first area and encircling said information to be qualified.

31. A system as claimed in claim 29, characterized in that the information which is qualified is selected by passing said handheld device from said second area, to said first area and encircling said information to be qualified and back to said second area.

32. A system as claimed in claim 20, characterized in that said first area comprises first information and that said second area comprises second information, and that said association involves that said first and second information are interconnected to a single piece of information.

33. A system as claimed in claim 20, characterized in providing at least a further area comprising coordinates which are discontinuous with said first and second coordinates, and passing said handheld device in a single movement over all areas.

34. A system as claimed in claim 33, characterized in that said further area comprises a link to personal information, such as a v.card file.

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Fig. 1a

Fig. 1c

Fig. 1b
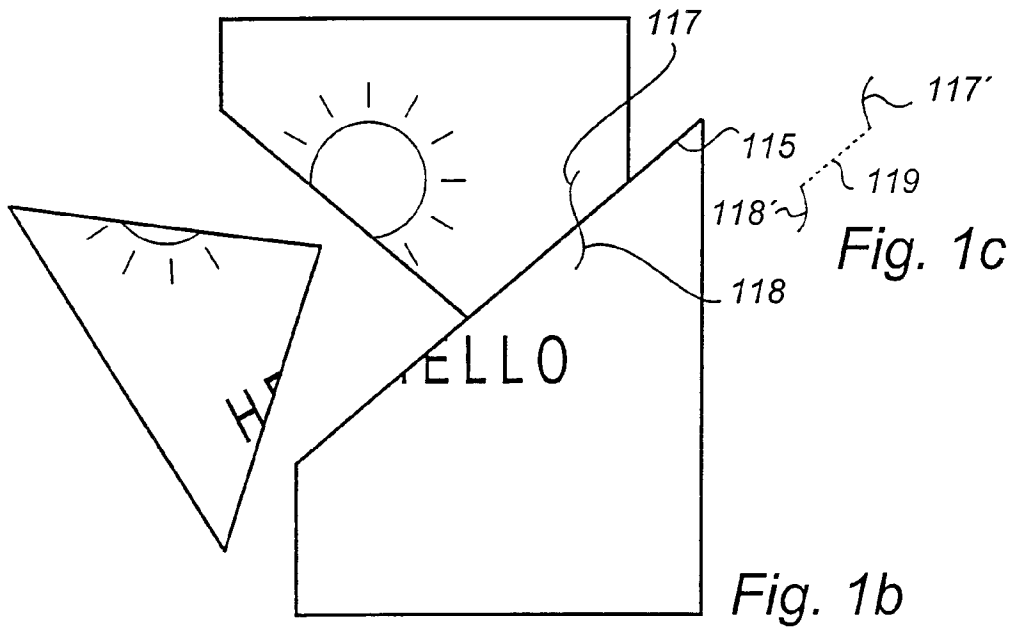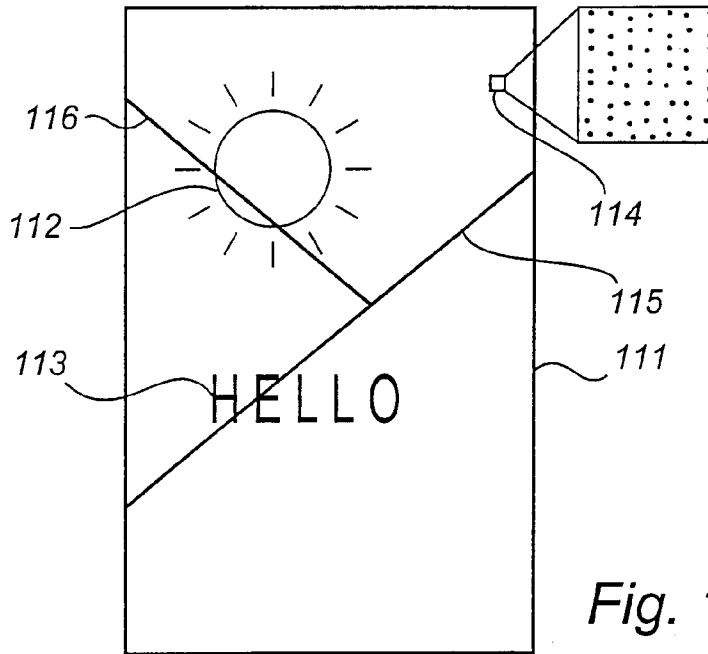
Fig. 2a   *Fig. 2b*

Fig. 3

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Fig. 4

Fig. 5
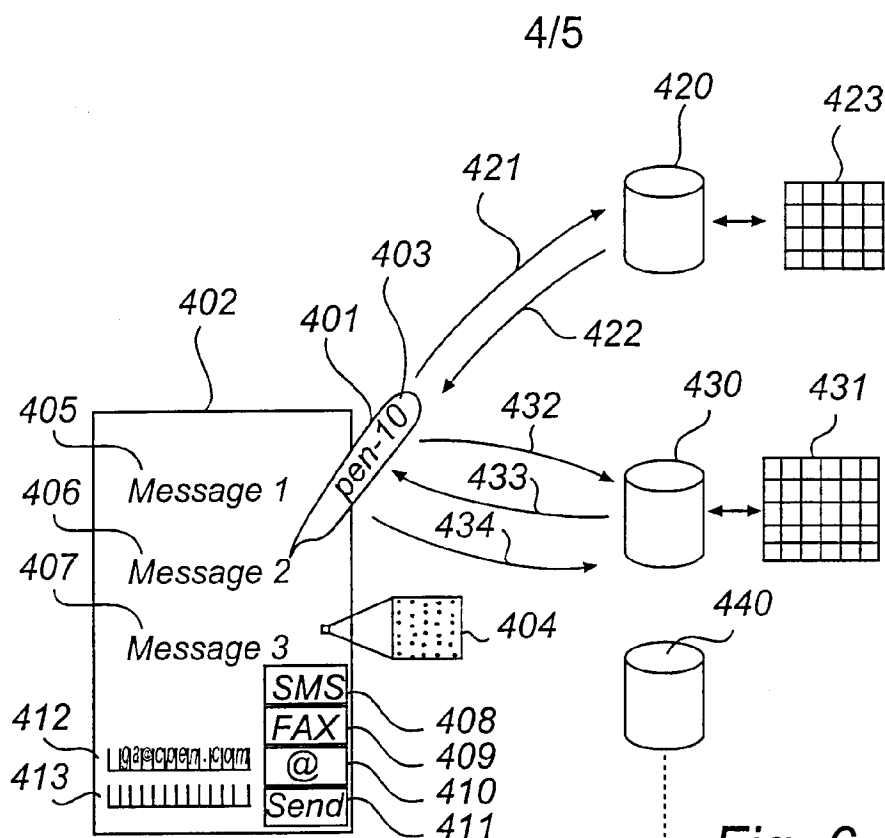
4/5

Fig. 6

Fig. 7
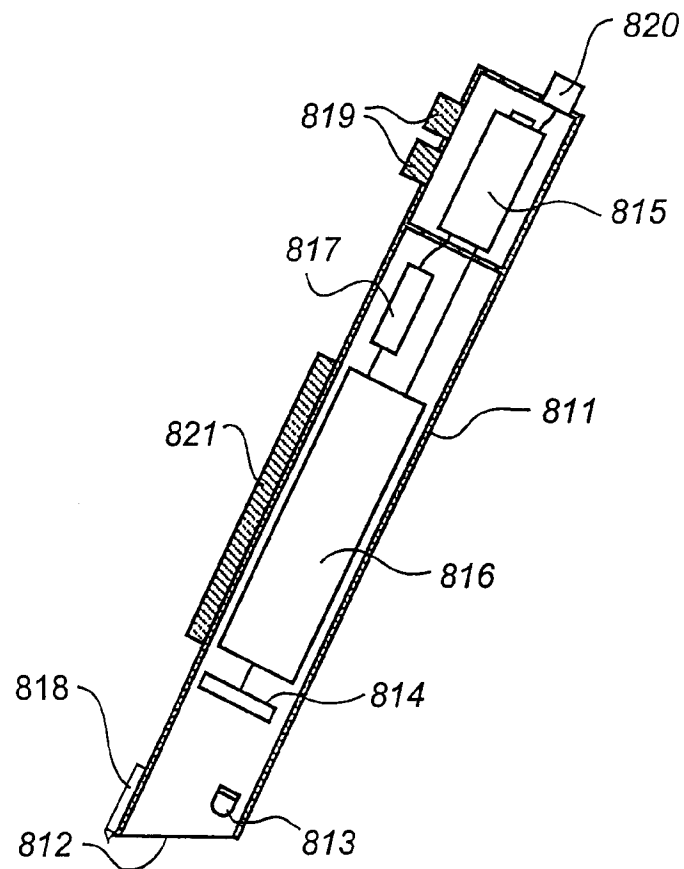
Fig. 8

INTERNATIONAL SEARCH REPORT

	International application No.
	PCT/SE 01/00750

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06K 11/18, G06K 19/06, G06F 3/033
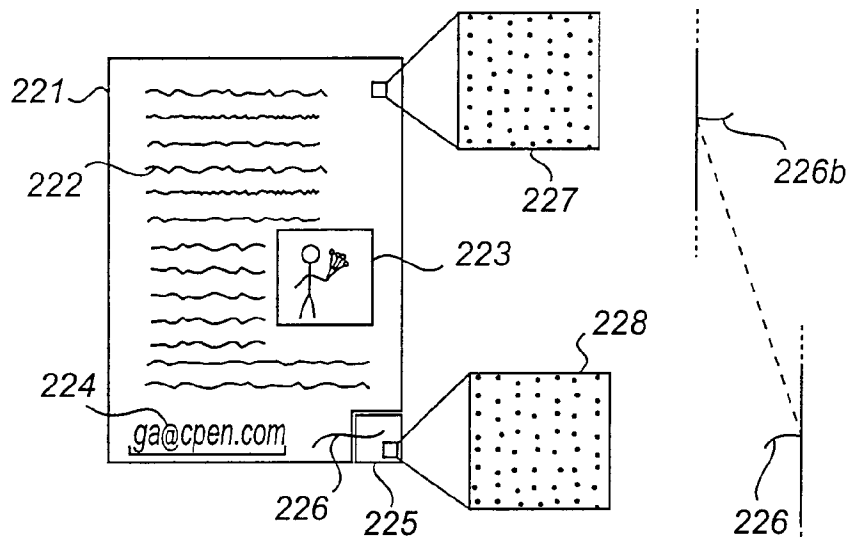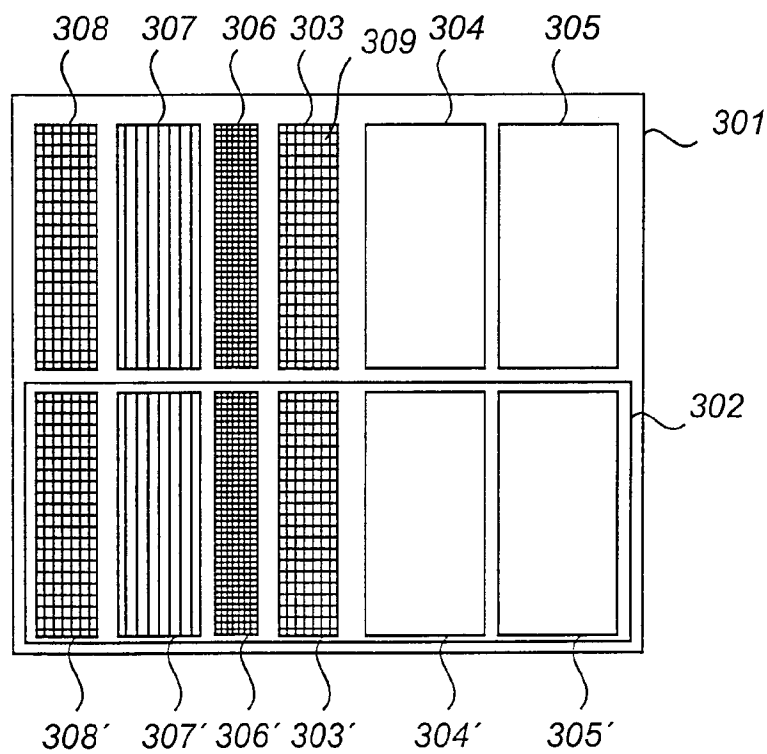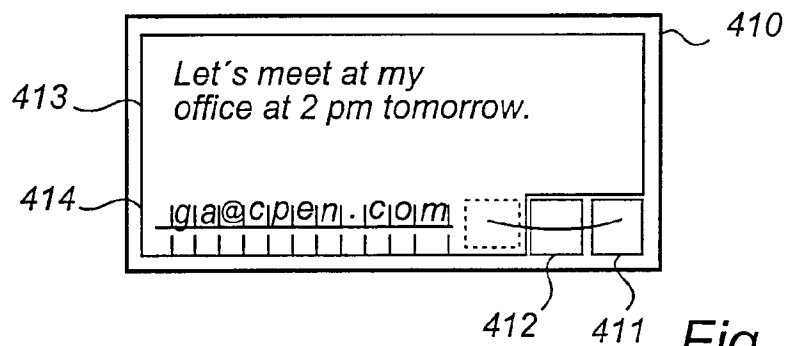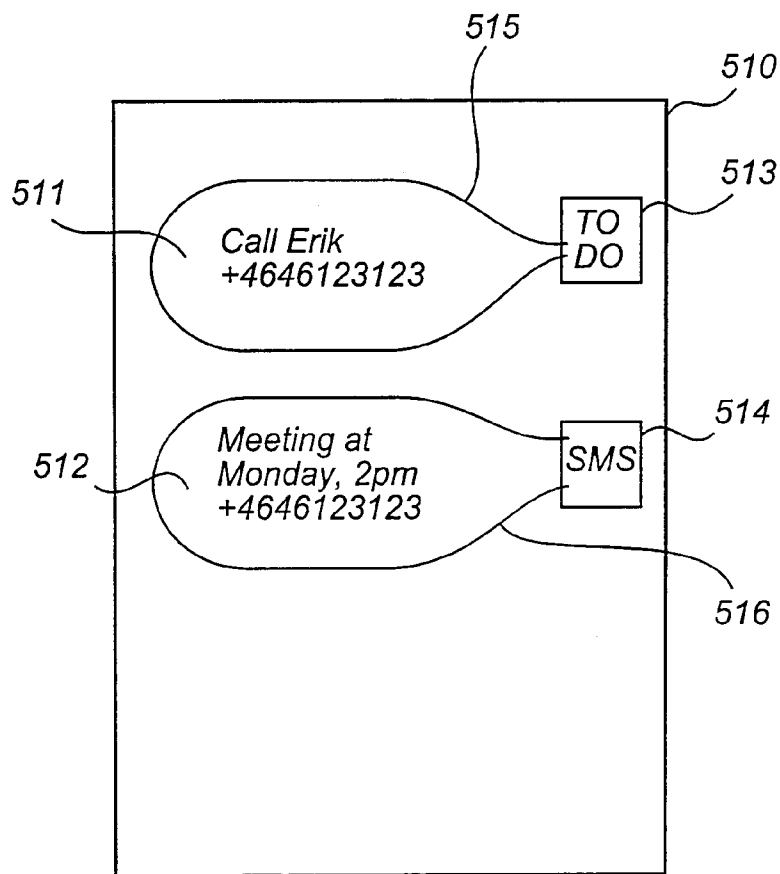According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI-DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9950787 A1 (XEROX CORPORATION), 7 October 1999 (07.10.99), page 2, line 11 – line 18; page 17, line 28 – page 18, line 10; page 18, line 21 – page 19, line 12, figures 1,7-11,14-15, claims 1-3,5-7, abstract, page 19, line 28 – page 20, line 9	1-12,15-29, 32-34
	--	
P,X	WO 0072244 A1 (SILVERBROOK RESEARCH PTY LTD), 30 November 2000 (30.11.00), page 2, line 5 – page 3, line 33, figures 1-2,5,8,79, claims 1-5, abstract	1-12,15-29, 32-34
	--	

X	Further documents are listed in the continuation of Box C.		X	See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2001	17 -07- 2001

Name and mailing address of the ISA	Authorized officer
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Pär Heimdal/AE Telephone No. + 46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E,X	WO 0122208 A1 (SILVERBROOK RESEARCH PTY. LTD.), 29 March 2001 (29.03.01), page 2, line 32 - page 5, line 21; page 8, line 19 - line 28; page 38, line 13 - page 39, line 10, abstract, page 56, line 13 - page 56, line 19, page 57, line 30 - page 58, line 12; figures 1,5,8-9,52-53 --	1-12,15-29, 32-34
A	US 5852434 A (O.F. SEKENDUR), 22 December 1998 (22.12.98), see the whole document -- --------	1-34

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
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				AU	4725900	A	12/12/00
				AU	4726000	A	12/12/00
				AU	4726100	A	12/12/00
				AU	4726200	A	12/12/00
				AU	4726300	A	12/12/00
				AU	4726400	A	12/12/00
				AU	4726500	A	12/12/00
				AU	4726600	A	12/12/00
				AU	4726700	A	12/12/00
				AU	4726800	A	12/12/00
				AU	4726900	A	12/12/00
				AU	4727000	A	12/12/00
				AU	4727100	A	12/12/00
				AU	4727200	A	12/12/00
				AU	4727300	A	12/12/00
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				AU	4728400	A	12/12/00
				AU	4728500	A	12/12/00
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				AU	4729000	A	12/12/00
				AU	4729200	A	12/12/00
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				AU	4730100	A	12/12/00
				AU	4730200	A	12/12/00
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				AU	4730500	A	12/12/00
				AU	4730600	A	12/12/00
				AU	4730700	A	12/12/00
				AU	4730800	A	12/12/00
				AU	4730900	A	12/12/00
				AU	4731000	A	12/12/00
				AU	4731100	A	12/12/00
				AU	4731200	A	12/12/00
				AU	5509500	A	12/12/00
				AU	PQ055999	D	00/00/00
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Patent document cited in search report			Publication date	Patent family member(s)			Publication date
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				AU	4726600	A	12/12/00
				AU	4726900	A	12/12/00
				AU	5375100	A	22/01/01
				AU	5375200	A	22/01/01
				AU	5511700	A	22/01/01
				AU	5662800	A	22/01/01
				AU	PQ291299	D	00/00/00
				WO	0072192	A	30/11/00
				WO	0072241	A	30/11/00
				WO	0072242	A	30/11/00
				WO	0072244	A	30/11/00
				WO	0102940	A	11/01/01
				WO	0103015	A	11/01/01
				WO	0103016	A	11/01/01
				WO	0103017	A	11/01/01
				WO	0122207	A	29/03/01
				WO	0122357	A	29/03/01
				WO	0122358	A	29/03/01
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	International application No.
	PCT/SE 01/00750

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				AU	5375600 A	22/01/01
				AU	5375700 A	22/01/01
				AU	5375800 A	22/01/01
				AU	5375900 A	22/01/01
				AU	5376000 A	22/01/01
				AU	5376100 A	22/01/01
				AU	5376200 A	22/01/01
				AU	5511700 A	22/01/01
				AU	5511800 A	22/01/01
				AU	5511900 A	22/01/01
				AU	5512000 A	22/01/01
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				AU	PQ131399 D	00/00/00
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